

# **Virtual Reality Diffusion in Agricultural Institutions: Addressing COVID-19 Instructional Challenges**

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## **Introduction and Theoretical Framework**

The COVID-19 pandemic created the largest digital intervention of educational systems in human history (Pokhrel & Chhetri, 2021). Virtual reality technologies are examples of digital instructional tools that educators primarily use for virtual training or immersive curricular experiences (Kavanagh et al., 2017). Virtual reality can provide many opportunities for education outside of the classroom, as Ahir et al. (2020) determined that virtual reality technology can be applied as a means for learning in sports and military-based training exercises. De Ponti et al. (2020) set out to understand medical students' perceptions of using virtual reality and determined that 84% of their sample considered using virtual reality in the future for their medical training. As the literature indicates, there is a prevalence of virtual reality technologies in training-based practices, however, it also indicates that research should investigate opportunities that exist for virtual reality-based education (Di Natale et al., 2020).

Diffusion is the process that an innovation undergoes as it is communicated through social systems over time (Rogers, 2003). Understanding how innovations can reach mass media, Rogers (2003) suggested five attributes that persuade innovation diffusion. Relative Advantage is deemed how the innovation is seen to be better comparative to the existing innovation. Compatibility is the extent an innovation can be perceived to meeting past experiences or current needs of stakeholders (Rogers, 2003). Complexity identifies the innovation's perceived difficulty to use. Trialability underscores the degree an innovation can be tested before adopting, and observability refers to the visibility of the innovation by other members of a social system. Rogers (2003) determined all five attributes are positively correlated with innovation adoption outside of complexity.

## **Purpose and Objectives**

The purpose was to investigate virtual reality adoption as means of diffusing instruction in higher education institutions. The research objectives were:

1. Identify the virtual reality adoption attributes.
2. Discern virtual reality persuasion attributes in agricultural institutions.

## **Methodology**

The researchers conducted a systematic literature review to deeper explore the purpose of the research. A systematic review helps scholars understand others' ideas regarding findings and theories from related studies (Fraenkel et al., 2019). A systematic review is a research method utilizing a comprehensive search based on keywords to review existing literature with a combination of data focusing on related topics (Lee et al., 2021). The researchers examined publications implementing virtual reality as an instructional tool from eighteen ( $N = 18$ ) impact factor journals provided by the Web of Science (WoS) (2021). The WoS (2021) indicated seventeen higher education journals (*Internet and Higher Education, Assessment & Higher Education, International Journal of Educational Technology in Higher Education, Active Learning in Higher Education, Higher Education, Higher Education Research & Development, Journal of Marketing for Higher Education, The Journal of Higher Education, Teaching in Higher Education, Research in Higher Education, International Journal of Sustainability in Higher Education, Journal of Diversity in Higher Education, Higher Education Policy, Journal*

*of Computing in Higher Education, Journal of Geography in Higher Education, Journal of Higher Education Policy and Management, Review of Higher Education*) with an impact factor above 1.6. The researchers had access to sixteen of the journals as one publication did not have a subscription agreement with [university]. The additional journal is the *Virtual Reality* journal, the premier virtual reality technology journal, with an impact factor of 5.095 (WoS, 2021). The researchers limited the extent of the study by only reviewing published literature in the years 2016 to 2021.

### **Results and Conclusions**

In total, there were 217 ( $N = 217$ ) publications examined, with a focus on articles mentioning virtual reality instructional use in higher education. However, approximately 90% of the articles did not fit the search term criteria set by the researchers. The systematic review conducted by the researchers identified twenty-one ( $n = 21$ ) publications that did meet the search criteria.

The researchers established five common themes derived from the publications. Themes included higher education ( $n = 8$ ), experiential learning ( $n = 3$ ), gamification ( $n = 3$ ), eLearning ( $n = 6$ ), and virtual reality ( $n = 6$ ). Themes derived from this systematic review could be generalized into these groupings based upon the articles. Pellas et al. (2021) identified that key characteristics of virtual reality use in higher education can stem to experiential learning, usability issues, student learning outcomes, and overall learning performance. Fromm et al. (2021) detected items such as virtual reality, higher education, and experiential learning are all factors into virtual reality use for instruction in higher education. Students' perceptions of virtual reality use during the COVID-19 pandemic were positive, as reported by De Ponti et al. (2020).

Hagge (2020) displayed how higher education students in geography are able to learn via virtual reality technologies. Therefore, literature indicated virtual reality can be a dissemination tool for specific instruction. The researchers found six ( $n = 6$ ) of the seventeen ( $N = 17$ ) journals produced key term results based on the systematic review and eleven ( $n = 11$ ) journals were void of the key terms. The researchers also identified one of the WoS (2021) impact factor journal for higher education provided zero ( $n = 0$ ) results when examining virtual reality instructional use in higher education. The data indicated virtual reality use in higher education agricultural institutions is non-existent in the literature.

### **Recommendations and Implications**

Developing an understanding of virtual reality attributes is needed prior to agricultural instructors' adoption of the instructional technology (Rogers, 2003). By understanding what virtual practices are being adopted in higher education institutions, researchers can provide agriculturalists information on new instructional technologies, teaching techniques, and recommended practices for improving student learning. The pandemic has illuminated the need for digital instructional tools to assist students achieve learning outcomes regardless of their location, time, and accessibility. Virtual reality can diffuse climate impacts on agriculture to a large populous (Strong et al., 2022). The global nature of education and business dictates future inquiries of virtual technologies will be needed by agricultural institutions and extension systems to ensure our field is meeting the needs of clientele in a timely manner.

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